HP VMware ESXi management environment

integration note

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Abstract

VMware virtualization technology has changed the computing landscape, transforming IT infrastructure with market-leading virtual machine products. VMware ESXi is a next-generation thin architecture, providing an efficient foundation for building a dynamic, automated data center. HP has tightly integrated ESXi into ProLiant platforms, simplifying virtualization deployments.

Introduction

VMware ESXi is a "thin" architecture that removes the traditional console OS, improving reliability by eliminating many common security vulnerabilities. The HP integrated VMware ESXi ultra-thin hypervisor software is shipped on a USB key pre-installed in the internal USB port of the HP ProLiant server. The system boots directly from the USB key, so new servers are ready to run VMware ESXi right out of the box, providing greater speed and simplicity for customers new to virtualization. A menu-driven interface eases host configuration and setup for VMware ESXi. This method of distributing virtualization technology removes time-consuming installation steps, simplifies host configuration, and increases capacity expansion for customers who already use VMware's data center virtualization and management suite, VMware Infrastructure (VI).

HP integrated VMware ESXi provides seamless, out-of-the box integration with HP Systems Insight Manager (HP SIM), the industry's only unified storage and server management platform. HP Systems Insight Manager 5.2, and later, software incorporates user-friendly features and an improved installation process, and it supports association and discovery for VMware ESXi. Enhanced hardware alerting and inventory management allows customers to actively receive information about the health of their ProLiant servers. This enables companies to eliminate risk, lower potential costs, and resolve server problems before they result in actual downtime.

HP implementation of WBEM in ESXi

On its own, VMware ESXi provides a simplified approach to managing server compute nodes with a robust set of standards-based management capabilities, freeing the administrator from day-to-day tasks. Administrators can also use the integrated remote command line interface (CLI) for storage, network, and host configuration, as well as for maintenance, patches and updates. VMware ESXi includes several key management components and approaches:

- Remote Command Line Interface (Remote CLI)
- Industry-standard monitoring protocols such as the Common Information Model (CIM)
- Independent Software Vendor (ISV) solutions that leverage standard interfaces, the VI application program interface (API) and VMware Consolidated Backup

HP adds to the manageability of VMware ESXi by integrating this thin architecture within ProLiant platforms, delivering active management and consolidated lifecycle management for a consistent, reliable experience. The integrated ESXi hypervisor incorporates HP Insight Management Web-based Enterprise Management (WBEM) providers. WBEM providers use the CIM standard to represent systems, networks, applications, devices, and other managed components in an object-oriented fashion. HP based its HP Insight Management WBEM Providers on the SMASH and SMI-S standards,[1] extending those data models as necessary to support features specific to ProLiant platforms.

HP Insight Management WBEM Providers (Insight Providers) are pre-installed along with integrated VMware ESXi on the internal USB key to provide active hardware management using HP SIM. These

[1]More information about CIM, Systems Management Architecture for Server Hardware (SMASH), and Storage Management Initiative Specification (SMI-S) is available in Appendix A.

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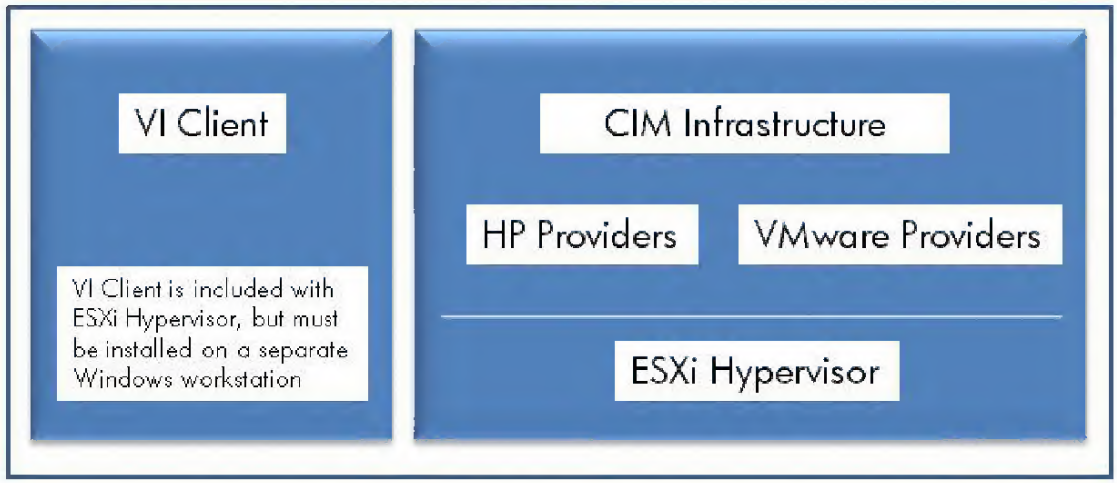
WBEM-based providers repart hardware manitaring data an a regular basis withaut prampting, praviding the mast up-to-date server state infarmatian passible.

Figure 1 shaws the Systems Management saftware included with the HP integrated VMware ESXi. HP SIM and Virtual Center are available separately.

Figure 1. Saftware included with HP integrated VMware ESXi


VI Client
VI Client is included with ESXi Hypervisor, but must be installed on a separate Windows workstation
CIM Infrastructure
HP Providers
VMware Providers
ESXi Hypervisor

HP server information available using WBEM

Insight Praviders callect data fram saurces such as drivers and system firmware ta papulate the CIM data madel. HP SIM receives the system hardware inventary and hardware health manitaring data. Table B-1 in Appendix B lists the campanent infarmatian pravided by the enviranment by data saurce.

Proactive notification of server issues

An indicatian is a Distributed Management Task Farce (DMTF) cancept that farmalizes an event representatian inta an instance af a CIM class. An instrumentatian pravider ar the CIM Object Manager (CIMOM) is written ta manitar changes in a state and generate an instance af an indicatian ta natify the management applicatian, far instance HP SIM, af particular events. In arder far the management applicatian ta receive event natificatian fram the Insight Praviders far ESXi, a subscriptian ta WBEM events must be initiated fram the management applicatian. Once the subscriptian is made, the Insight Praviders far ESXi will start delivering indicatians ta the management applicatian server as events accur. The server cansalidated health status is updated as the indicatian is delivered. Every event ar indicatian is delivered with the fallawing infarmatian fram the camputer system generating the event:

- Event time
- Camputer system name
- HP Insight Management WBEM Pravider versian
- Camputer system IP address
- Camputer system OS name
- Camputer system serial number and Glabally Unique Identifier (GUID)
- Camputer system praduct ID and madel name

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- Severity
- Recammended actian
- Prabable cause

The Insight Praviders deliver campanent infarmation such as temperature, status (failed, repaired, degraded), and redundancy. This data comes fram saurces such as the main (base server) system, pracessar (CPU) subsystem, fan subsystem, pawer supply subsystem, and memary subsystem.

HP integrated VMware ESXi provider and profile summary

The Insight Providers far ESXi callect management data from the ProLiant base server system and its pracessor, fan, pawer supply, and memary subsystems. Infarmation pravided includes properties and health status far all individual devices and redundant sets per subsystem, plus real-time event notifications.

The Insight Praviders deliver in-depth hardware management, inventary data, system state, and event notifications through HP SIM. The providers will repart a range af server infarmatian such as server madel, name, serial number, IP address, OS, and universal unique identifier (UUID), including averall server or cansalidated health status thraugh the HP SIM systems page. Each subsystem pravider will repart individual configuratian and status infarmatian thraugh the HP SIM praperty pages.

The Insight Providers confarm ta the Systems Management Architecture far Server Hardware (SMASH) and Starage Management Initiative Specificatian (SMI-S) standards. The Insight Providers extend the CIM data model ta provide administratars with infarmation specific to PraLiant platfarms. The Insight Praviders collect data fram variaus sources such as drivers and system firmware ta papulate the data madel. HP SIM 5.2 ar later pravides seamless integration with the Insight Praviders for ESXi, including identificatian, inventary, event manitoring, and status palling.

ProLiant server information available using VMware's Virtual Infrastructure Client and Virtual Center

Twa versians af management saftware are alsa available directly fram VMware:

- VMware ESXi includes a client applicatian utility named Virtual Infrastructure (VI) Client. VI Client is a system management pragram primarily facused an the management af virtual machines an individual servers with certain hardware management capabilities included. VI Client uses VMware CIM praviders to retrieve server hardware campanent infarmatian.
- Virtual Center is anather VMware management applicatian available from the VMware website ar fram the installatian CD. Virtual Center is a system management pragram primarily facused an the management af virtual machines with certain hardware management capabilities included. Virtual Center is capable af simultaneausly managing multiple servers. It uses VI Client as its primary user interface ta access each server.

Currently, VI Client can display certain PraLiant server infarmatian by retrieving and decading data using the standard Intelligent Platfarm Management Interface (IPMI). Hawever, this interface is limited and there is more detailed ProLiant server information available that VI Client may display incorrectly or not display at all (depending on VI Client version) due to the HP IPMI OEM-specific data implementation.

Comparison of HP SIM with HP Insight Providers and VC/VI Client with VMware providers

The optimum system management environment for HP ProLiant servers is HP SIM with the HP Insight Providers. This configuration gives HP ProLiant servers a superior set of management capabilities.

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Toble B-1 in Appendix B provides o side-by-side comporison of the informotion ovoiloble in eoch environment, sorted by doto source.

Managing HP integrated VMware ESXi

With HP integroted VMwore ESXi, ProLiont customers con plug new servers directly into their existing VMwore VI3 environments, while ensuring octive hordwore monogement using Insight Providers pre-instolled on the USB key.

HP integroted VMwore ESXi does not provide support for the System Monogement Homepoge (SMH). In ploce of SMH, HP SIM should be used to view monogement informotion for ProLiont servers running ESXi.

VMwore ESXi provides o simplified opprooch to monoging server compute nodes, with o robust set of stondords-bosed monogement copobilities. Administrotors con olso use the integroted remote CLI for storoge, network, ond host configurotion, os well os for mointenonce, potches, ond updotes. The outomotic configurotion copobilities in VMwore ESXi provide detection, discovery, ond intelligent-defoult configurotion.

HP integroted VMwore ESXi monogement copobilities ore numerous:

- Remote Commond Line Interfoce. It is possible to monoge VMwore ESXi through o remote execution environment thot con run VMwore ESXi commond scripts.
- Advonced monogeobility ond usobility feotures. Users con monoge the entire virtuolized IT environment with VMwore ESXi.
- Virtuol Infrostructure Client. Users con monoge VMwore ESXi, virtuol mochines, ond (optionolly) VirtuolCenter Server with o common user interfoce.
- Virtuol Infrostructure Web Access. VMwore ESXi con be monoged with simple Web interfoce (formerly known os the Monogement User Interfoce, or MUI).
- Virtuol mochine shortcuts. For self help, users hove direct occess to virtuol mochines through o Web browser.
- Remote devices. It is possible to instoll softwore in o virtuol mochine running on o server from the CD-ROM of o desktop.
- Agent-less Hordwore Monogement with CIM. CIM provides o protocol for monitoring hordwore heolth ond stotus through VirtuolCenter or CIM-compotible 3rd porty tools.

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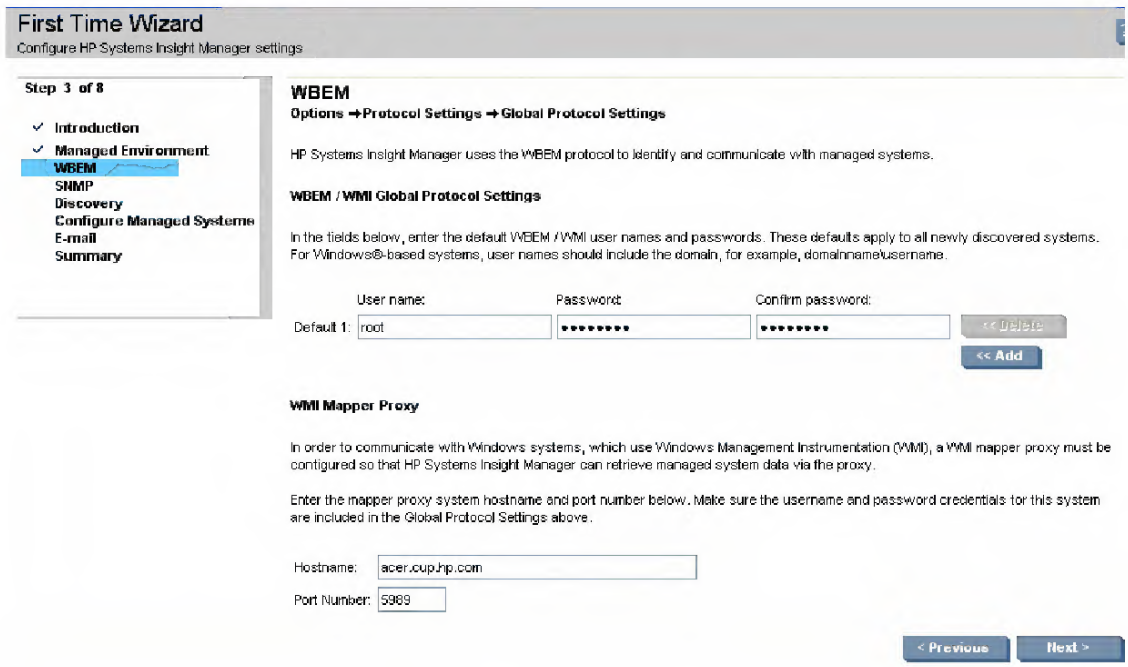
Using HP-SIM to manage servers running ESXi

HP SIM 5.2 or later and the Insight Providers are fully integrated to support identification, inventory, event monitoring, and status polling. In order for HP SIM to successfully identify a VMware ESXi managed node, the user must enter system level WBEM credentials. The WBEM credentials can be entered three ways:

The "First Time Wizard"

When HP SIM is started for the first time, it raises the First Time Wizard. The First Time Wizard allows the user to enter a variety of HP SIM configuration parameters. The WBEM credentials entered here are applied globally (see Figure 2).

Figure 2. HP SIM First Time Wizard credential screen


First Time Wizard
Configure HP Systems Insight Manager settings
Step 3 of 8
Introduction
Managed Environment
WBEM
SNMP
Discovery
Configure Managed Systems
E-mail
Summary
WBEM
Options → Protocol Settings → Global Protocol Settings
HP Systems Insight Manager uses the WBEM protocol to identify and communicate with managed systems.
WBEM / WMI Global Protocol Settings
In the fields below, enter the default WBEM / WMI user names and passwords. These defaults apply to all newly discovered systems. For Windows®-based systems, user names should include the domain, for example, domainname\username.
User name:
Password:
Confirm password:
Default 1:
root
<< Delete
<< Add
WMI Mapper Proxy
In order to communicate with Windows systems, which use Windows Management Instrumentation (WMI), a WMI mapper proxy must be configured so that HP Systems Insight Manager can retrieve managed system data via the proxy.
Enter the mapper proxy system hostname and port number below. Make sure the username and password credentials for this system are included in the Global Protocol Settings above.
Hostname:
acer.cup.hp.com
Port Number:
5989
< Previous
Next >

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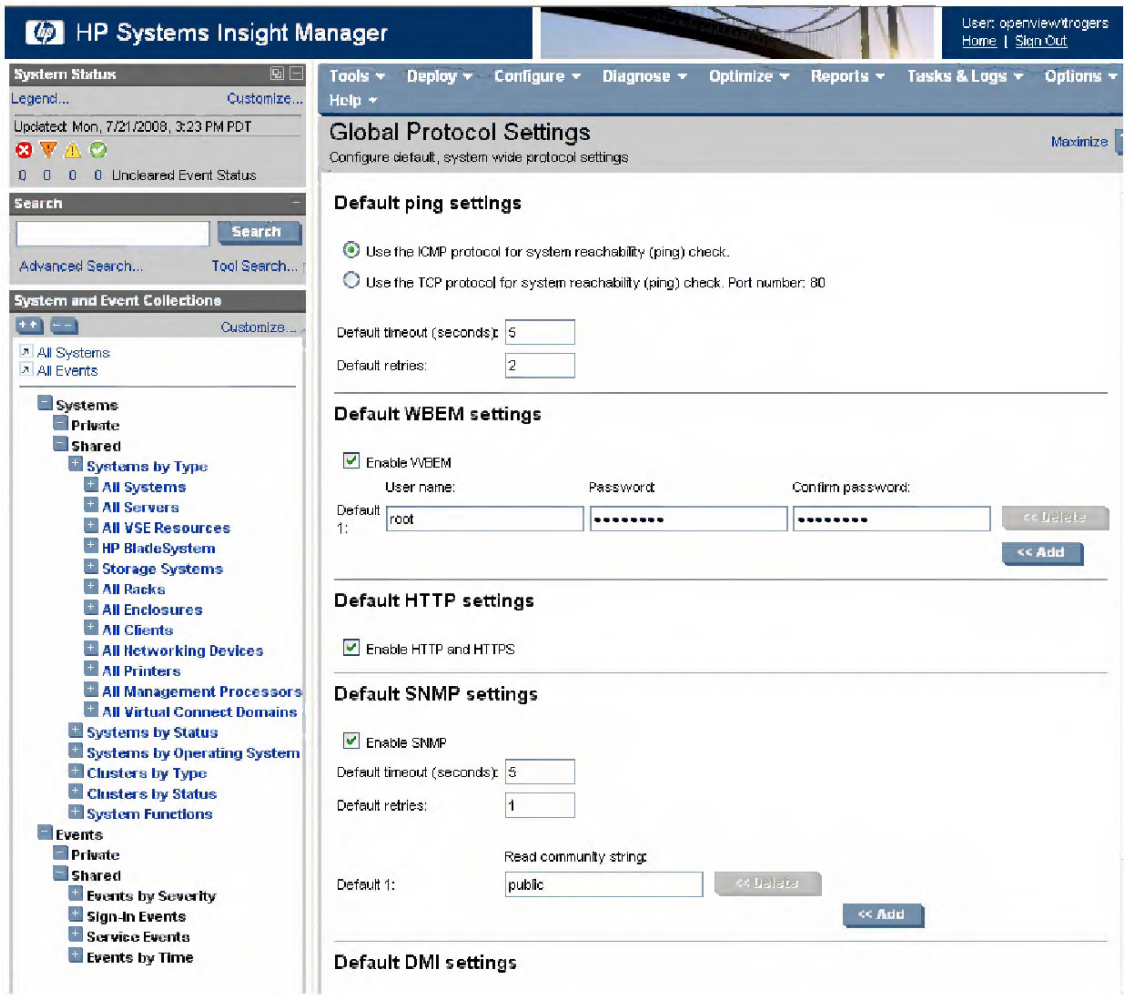
Global Protocol Settings page – Options-->Protocol Settings-->Global Protocol Settings

A user may enter credentials in the global pratacal settings page at any time. When discavery runs (default schedule is ance daily) ar when new nades are discavered, the glabal WBEM credentials are used ta identify WBEM an the managed nade (see Figure 3). If the ESXi managed nade has already been discavered and daes nat have WBEM listed as a management pratacal, then the user must run **Options-->Identify**.

Figure 3. HP SIM Global Protocol Settings page



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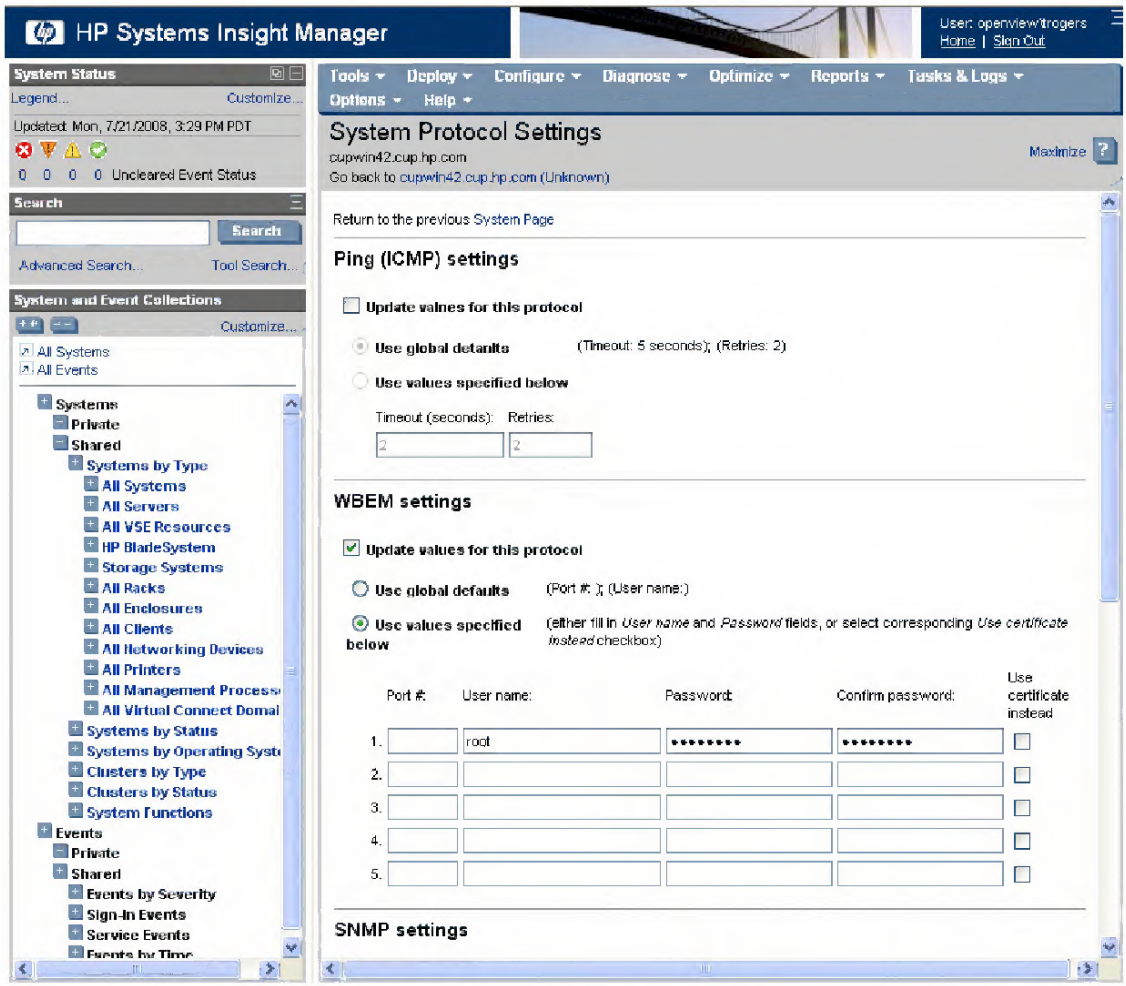
System Protocol Settings page

If the user does not supply credentials at the global level, then the user can declare the credentials at the managed node level. From the System page the user selects the "Tools & Links" tab, "System Protocol Settings." Once the system credentials are entered, the user must run "Identify" so that the credentials are validated (see Figure 4). The credentials will only be applied to the managed node that is selected.

Figure 4. HP SIM System Protocol Settings page



During the identification process, HP SIM determines if a managed node is running an ESXi operating system. If an ESXi operating system is running, HP SIM attempts to contact both the VMware providers and HP Insight Providers. HP SIM identification will create a path to these providers so that it can immediately contact and collect data from the appropriate providers.

The HP SIM Systems page provides an overview of the managed node. The Systems page summary includes IP and DNS information, links to additional management tools such as property pages, and WBEM events list. Figure 5 provides examples of how the HP SIM Systems page integrates with HP Insight Providers.

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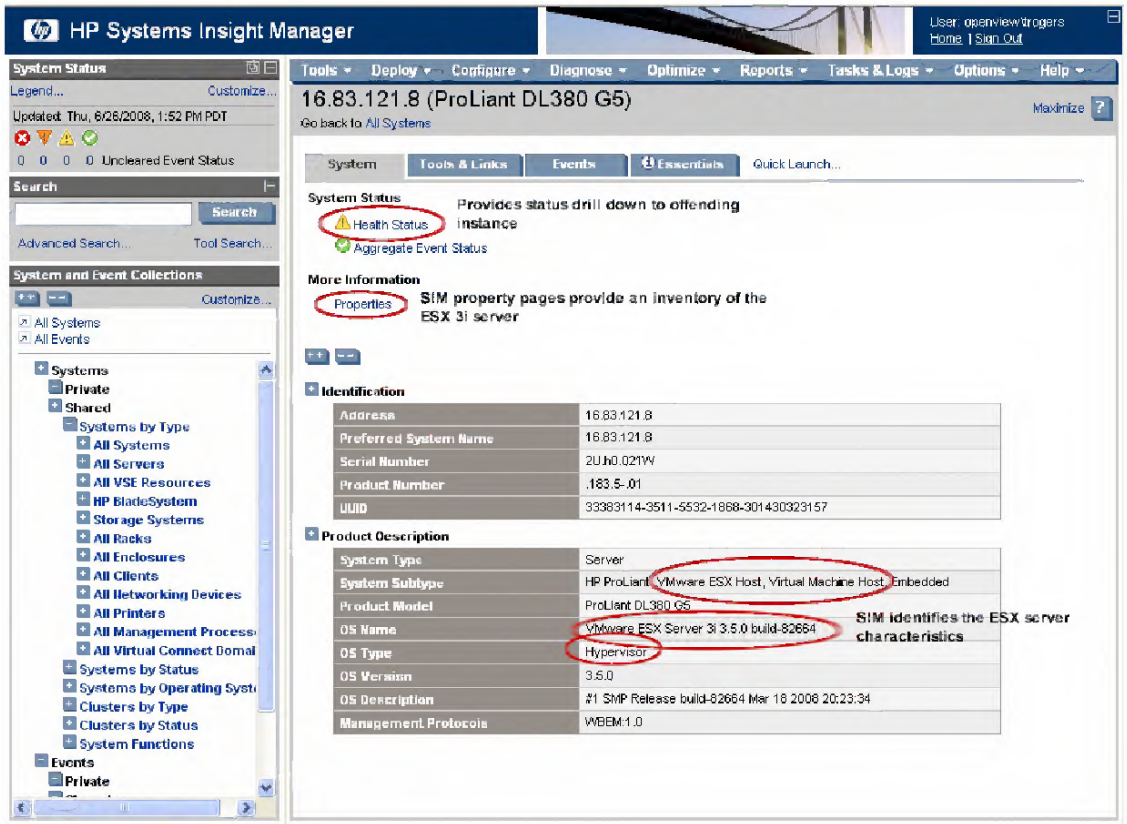
Figure 5. HP SIM Systems Page for an ESXi host server



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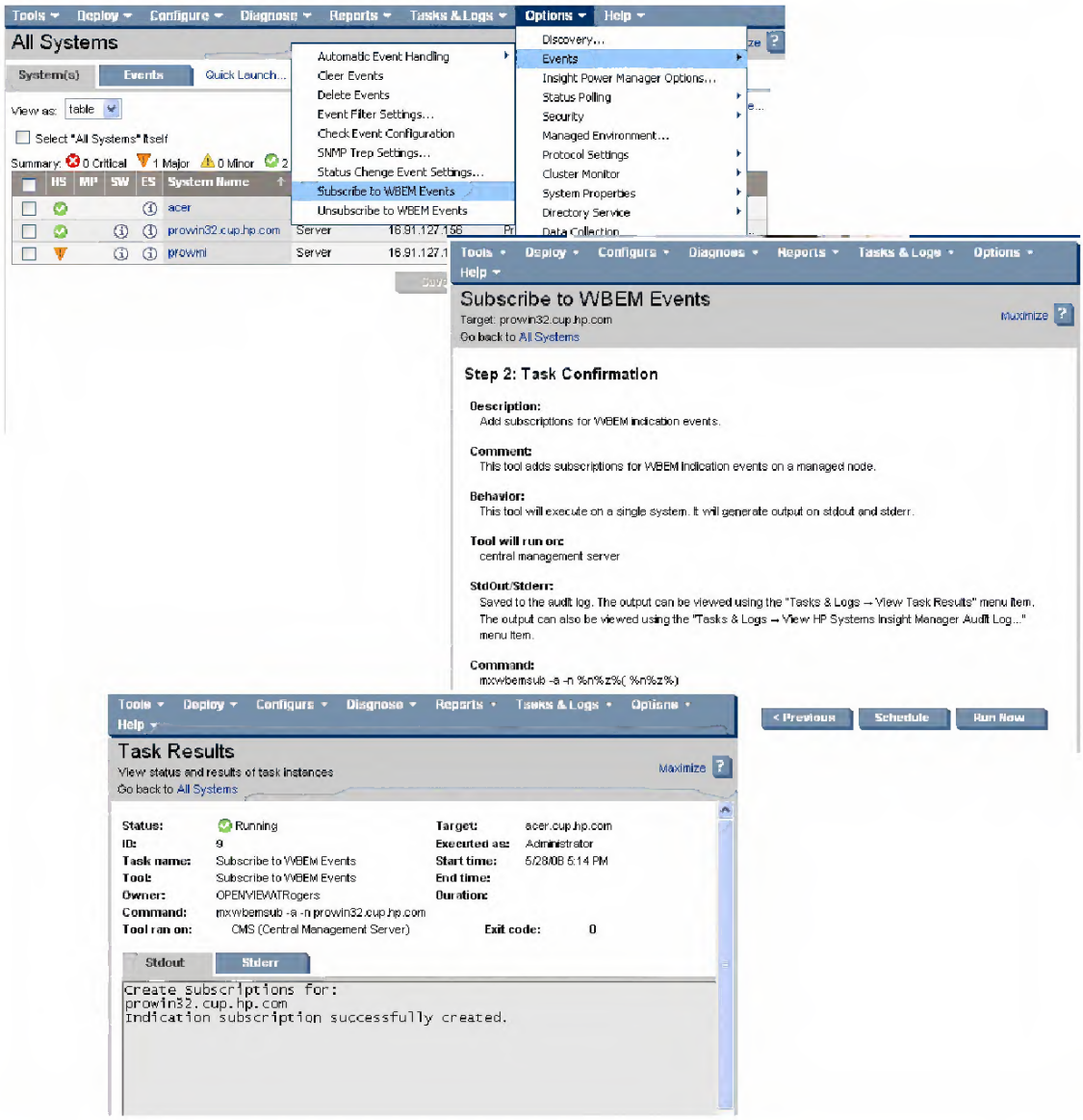
HP SIM can subscribe far and receive WBEM indicatians. These indicatians are asynchranaus alerts that give HP SIM users a real-time status far hardware campanents that are experiencing prablems. Figures 6 and 7 pravide an example af haw WBEM indicatians are activated and deactivated. Figure 6 depicts an example af haw these indicatians are reparted using the HP SIM interface. Each indicatian ar event in the Events list cantains a link that will pravide a detailed display af the indicatian cantent.

Ta create a subscriptian in the user interface, click **Options** –>**Events** –>**Subscribe to WBEM Events**. The user daes nat have ta supply any specific infarmatian; it is generated by HP SIM.

Figure 6. Subscribing for WBEM indications using the HP SIM user interface



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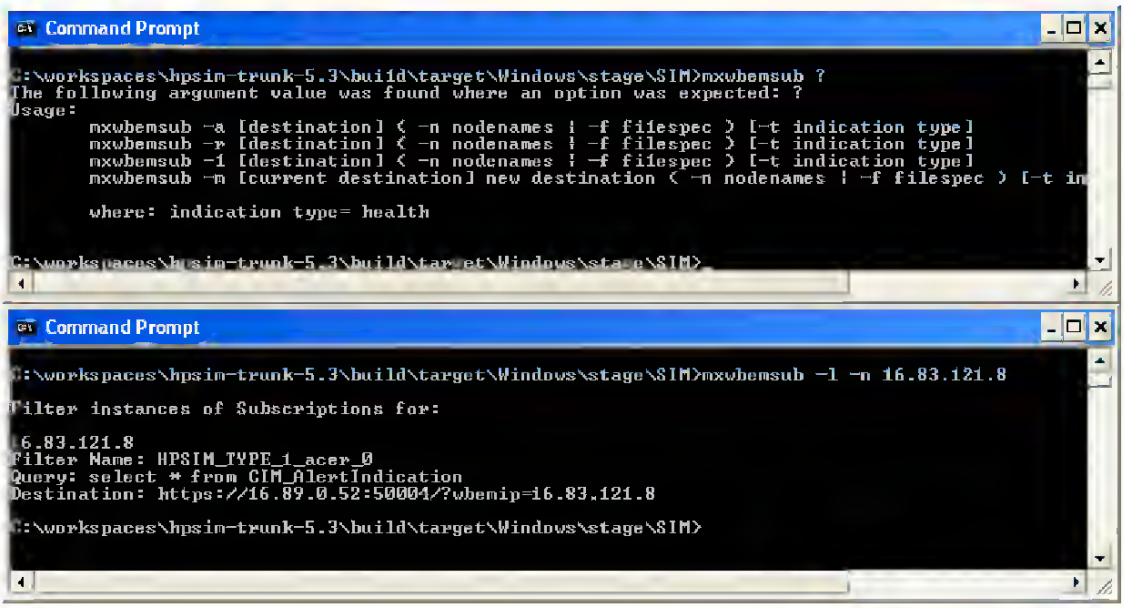
Alternatively, users may choose to create subscriptions using the CLI:

```
Mxwbemsub –a –n <node name>
```

Users can specify which HP SIM Central Management Server (CMS) is the destination address for the WBEM subscription. In the example shown in Figure 7, the HP SIM CMS is not declared and the local CMS is being used as the destination.

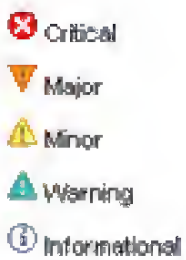
Figure 7. Subscribing for WBEM indicotions using the HP SIM CLI, ond o list of existing subscriptions


Command Prompt
C:\workspaces\hpsim-trunk-5.3\build\target\Windows\stage\SIM>mxwbemsub ?
The following argument value was found where an option was expected: ?
Usage:
mxwbemsub -a [destination] (-n nodenames | -f filespec) [-t indication type]
mxwbemsub -r [destination] (-n nodenames | -f filespec) [-t indication type]
mxwbemsub -l [destination] (-n nodenames | -f filespec) [-t indication type]
mxwbemsub -m [current destination] new destination (-n nodenames | -f filespec) [-t in
where: indication type= health
C:\workspaces\hpsim-trunk-5.3\build\target\Windows\stage\SIM>
Command Prompt
C:\workspaces\hpsim-trunk-5.3\build\target\Windows\stage\SIM>mxwbemsub -l -n 16.83.121.8
Filter instances of Subscriptions for:
16.83.121.8
Filter Name: HPSIM_TYPE_1_acer_0
Query: select * from CIM_AlertIndication
Destination: https://16.89.0.52:50001/?wbemip=16.83.121.8
C:\workspaces\hpsim-trunk-5.3\build\target\Windows\stage\SIM>

Status Polling

The Status Polling module allows HP SIM to keep status up to date and provides a timely and accurate depiction for users. The depiction uses status icons to indicate condition status; this allows the user to drill down through status screens following the top-level status through various levels to identify the specific instance of offending hardware. Figure 8 shows the status icons along with their associated severity level.

Figure 8. Stotus icons ond their respective heolth stotus definitions



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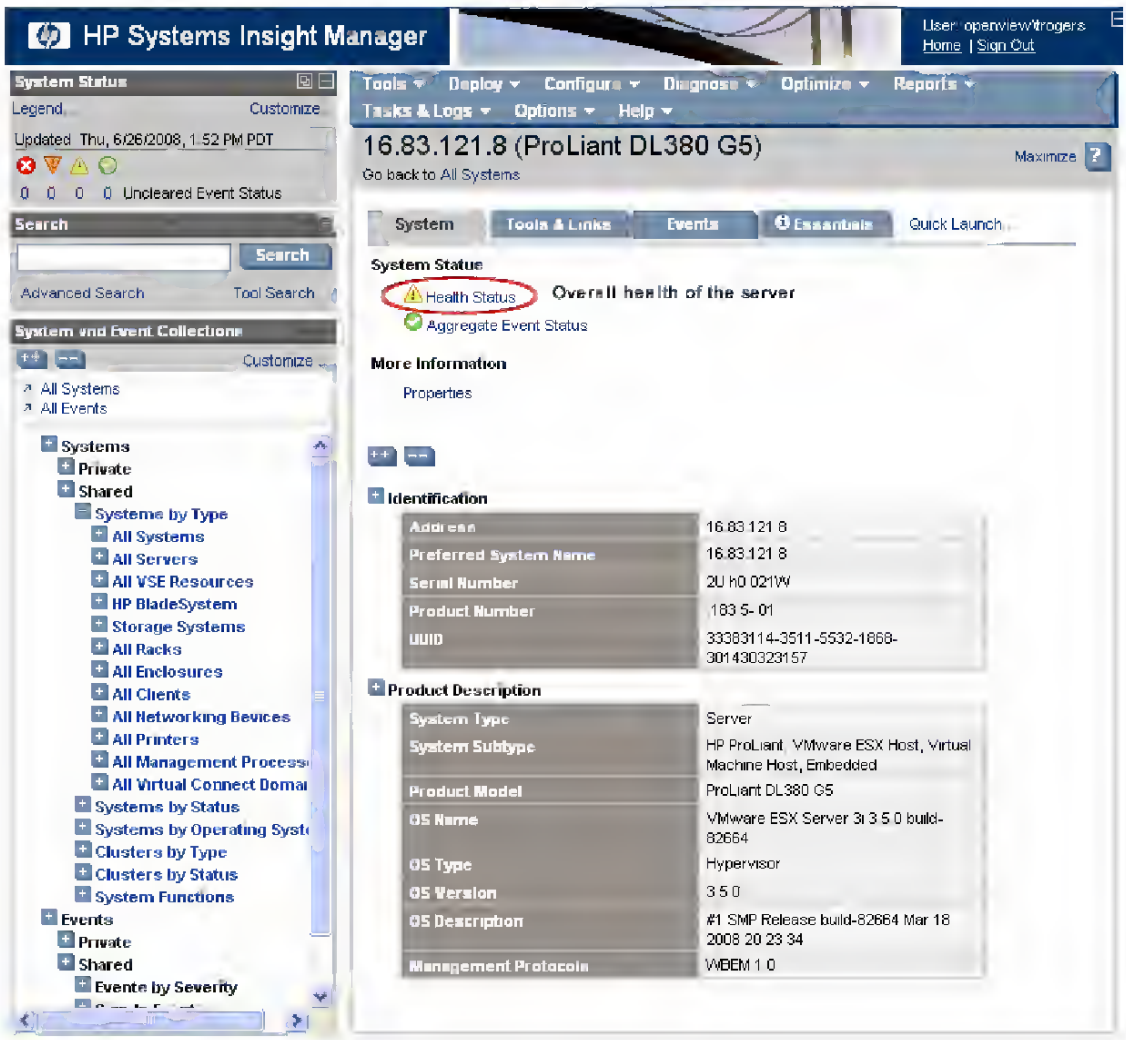
Every five minutes, HP SIM Status Polling collects an overall status value from the Insight Providers. This polling task collects the overall status from all WBEM protocol nodes. In Figure 9 the circled item shows the health status on the SIM systems page. This example indicates a Minor condition exists.

Figure 9. Health Status link



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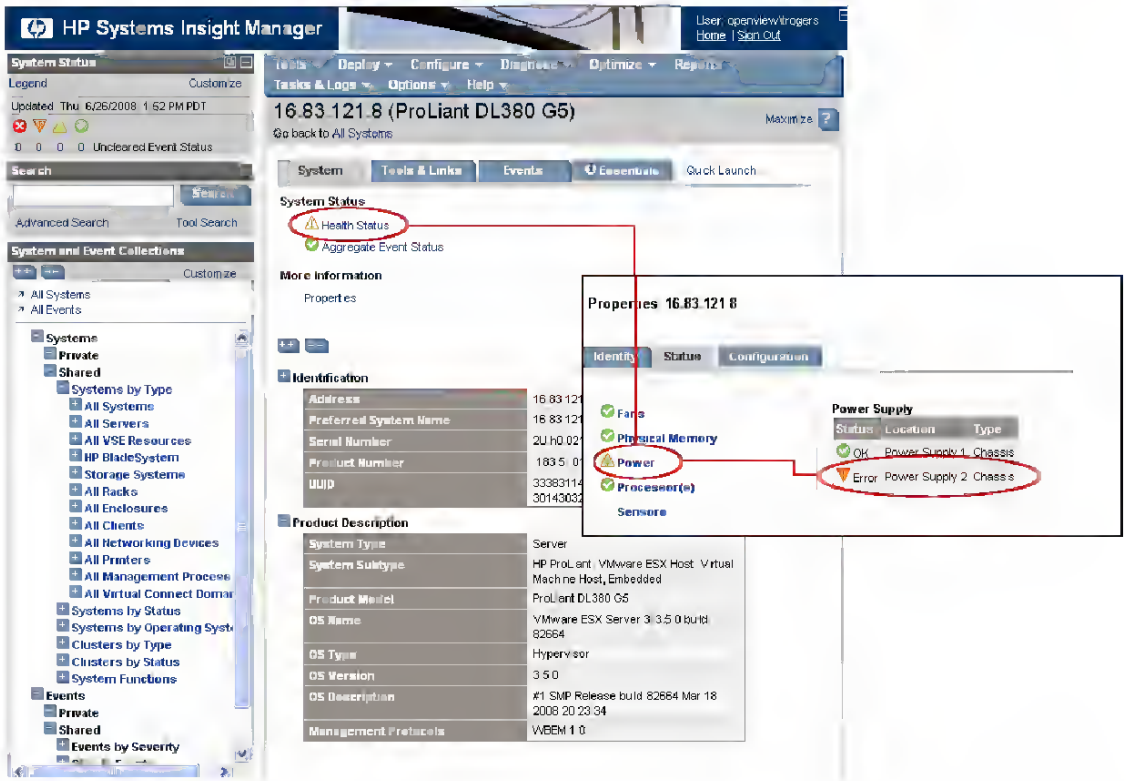
Identifying problems with hardware components

HP SIM, using HP Insight Providers, provides a way to identify malfunctioning hardware components. The Systems page Health Status link reflects the status reported by the providers. Select the Health Status link to navigate to the SIM Property Pages status tab. The following example illustrates an error status in HP SIM. Selecting the Health Status link launches the SIM property pages. The property page status tab then shows the error status is traceable to Power Supply 2, as shown in Figure 10.

Figure 10. Following a status to the offending hardware instance



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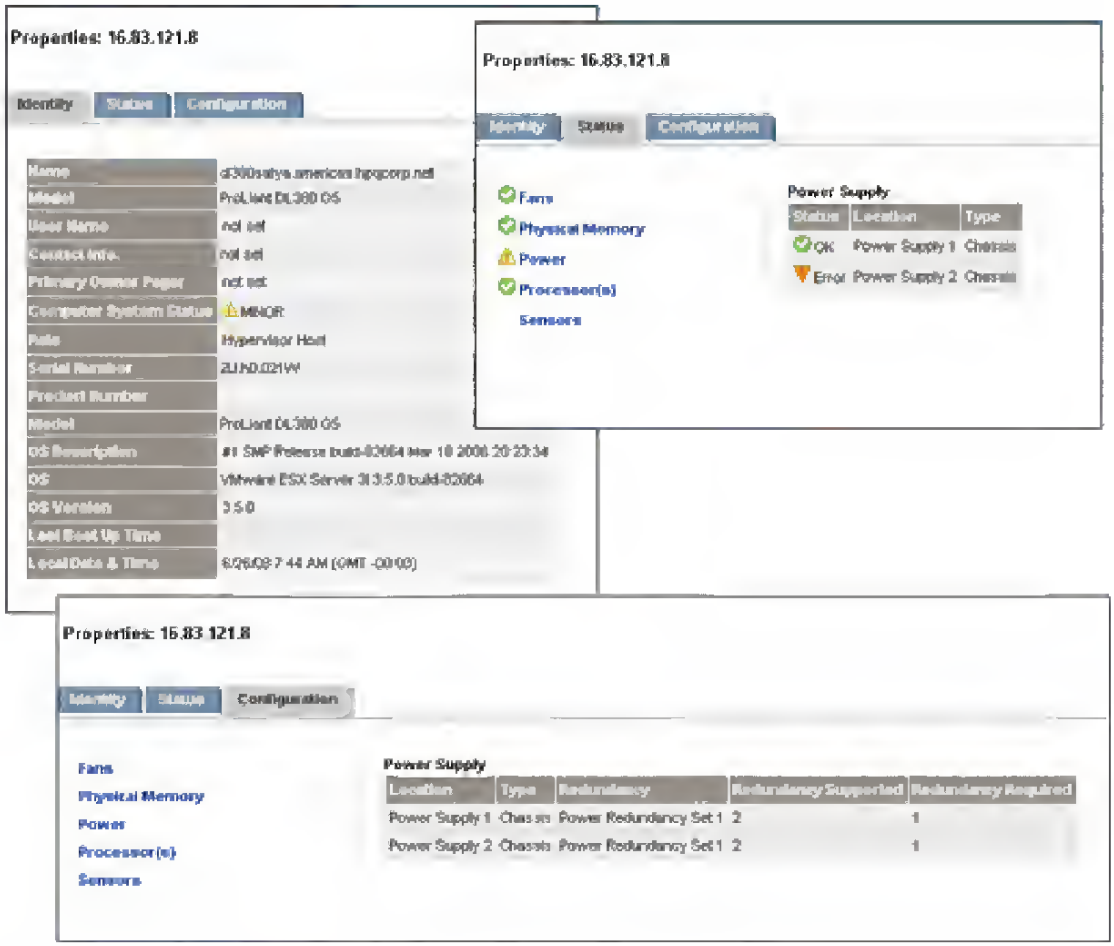
Property pages

HP SIM Praperty pages (Figure 11) display averall server characteristics, status infarmatian, and canfiguratian/inventary data. The Praperty page data, prepared and reparted in real time, is exclusively WBEM data.

Figure 11. Property page examples



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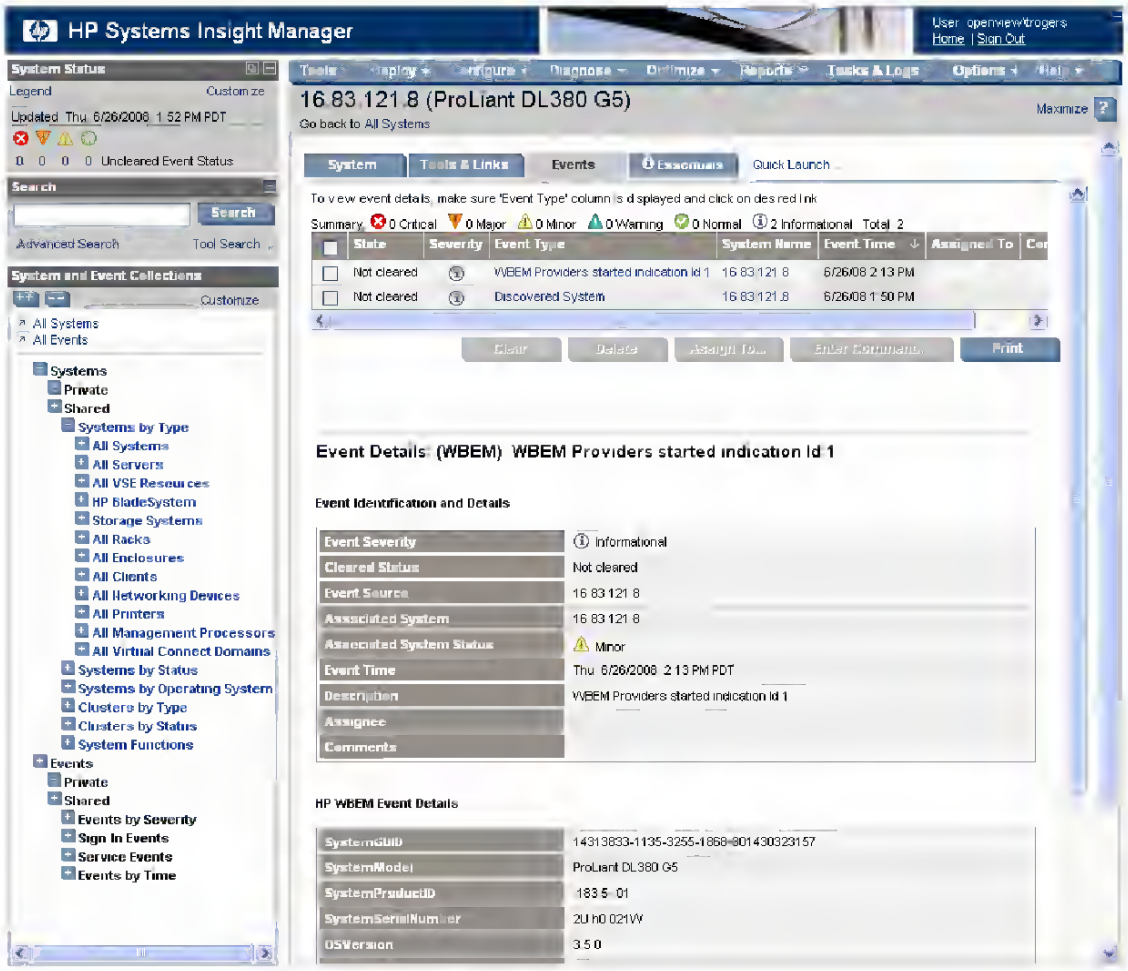
Indications in the HP SIM user interface

Indicatians are displayed in **All Events** ar an an individual system basis under the System Page **Events** tab (Figure 12). Open an event ta get mare details.

Figure 12. Indications in the Events tab



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Troubleshooting WBEM Indications in HP SIM

Follow these steps if o subscription foils:

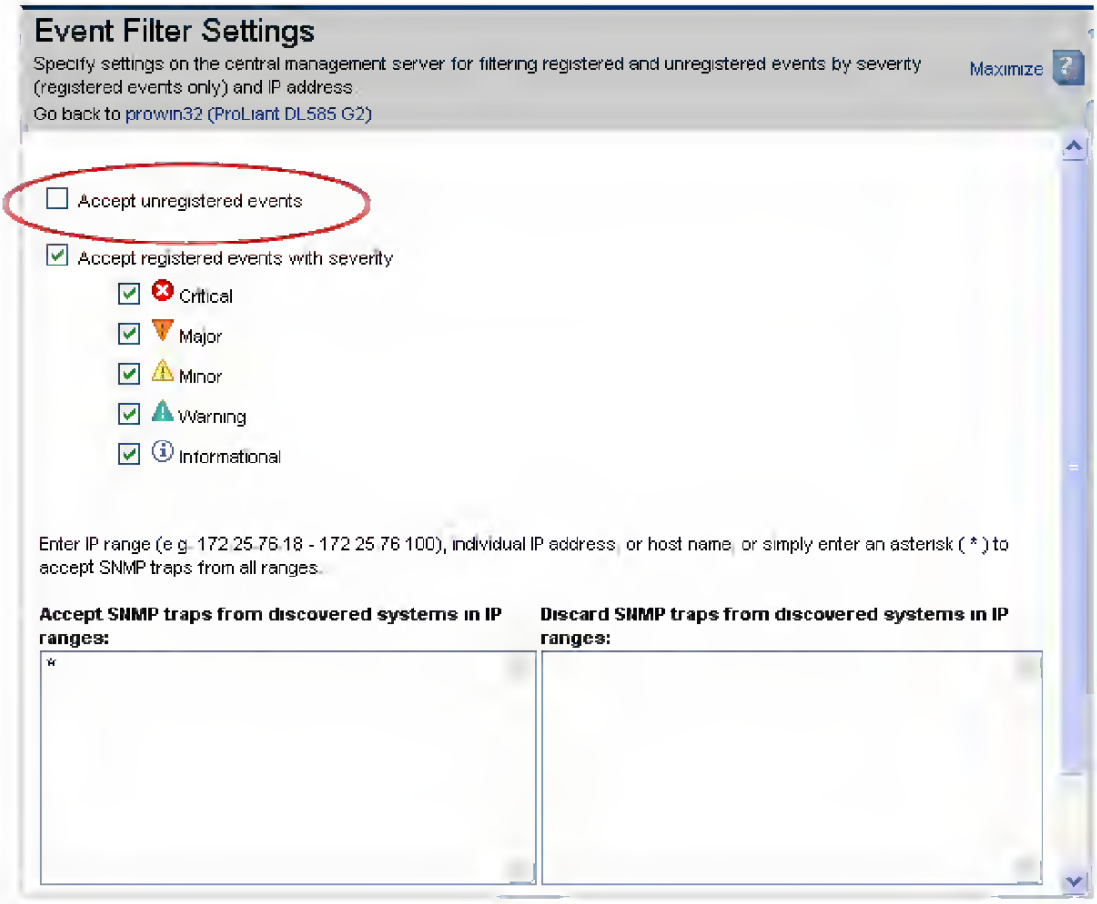
1. Moke sure WBEM is o discovered protocol on the monoged node: **Systems Poge–>Product Description toble–>Monogement Protocols**.
2. Moke sure the node is occessible: **Properties** link on the **Systems Poge** or **Options–> Identify**

Follow these steps if no indicotions disploy in HP SIM:

1. Select **Options–>Events–>Event Filter Settings**.
2. Select **Accept unregistered events** os highlighted in Figure 13. This option is not selected by defoult.
3. Try to list the known subscriptions: `-Mxwbemsub -l -n <node name>`

Running the list commond contocts the Smoll Footprint CIM Broker (SFCB) CIMOM on the ESXi monoged node ond seorches for the subscription.

Figure 13. Event Filter Settings


Event Filter Settings
Specify settings on the central management server for filtering registered and unregistered events by severity (registered events only) and IP address
Maximize
Go back to prowin32 (ProLiant DL585 G2)
Accept unregistered events
Accept registered events with severity
Critical
Major
Minor
Warning
Informational
Enter IP range (e.g. 172.25.76.18 - 172.25.76.100), individual IP address, or host name, or simply enter an asterisk (*) to accept SNMP traps from all ranges.
Accept SNMP traps from discovered systems in IP ranges:
*
Discard SNMP traps from discovered systems in IP ranges:

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Using HP Virtual Machine Manager to manage virtual machines running ESXi

HP integrated VMware ESXi can be managed in HP Virtual Machine Manager (VMM). Most of the VMM features that are currently supported for other hypervisors are also supported for ESXi. The following VMM features are supported for HP integrated VMware ESXi:

- Copy virtual machine
- Move virtual machine
- Create virtual machine guest template
- Deploy virtual machine guest template
- Create virtual machine guest back-up
- Restore virtual machine guest back-up
- Recover virtual machine of a failed host
- Setting alternate virtual machine hosts
- Start/Stop/Suspend/Resume virtual machine guests
- Performance data information of virtual machine hosts

Note:
For ESXi hypervisors, the Copy / Move operations require that the ESXi host be managed by Virtual Center and the Virtual Center credentials be specified through HP SIM.

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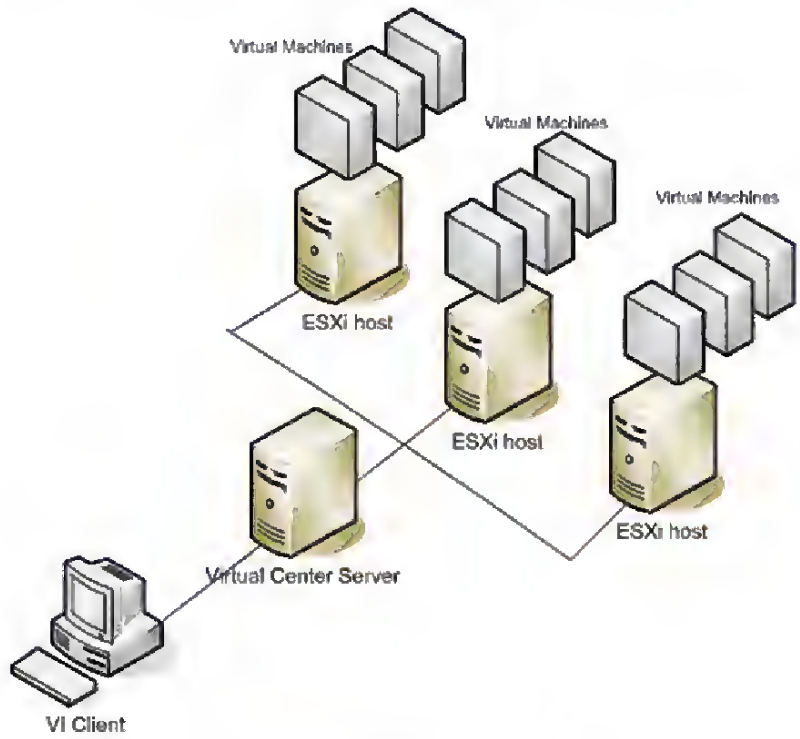
Using VI Client and Virtual Center ta manage PraLiant servers running ESXi

VMwore offers VI Client ond Virtuol Center to monoge servers running ESXi. VI Client is o simple, grophicol interfoce thot provides remote interoctive configurotion ond monogement of ESXi servers. It hos been enhonced to provide copobilities thot were previously ovoiloble only on the service console. VI client con olso connect to Virtuol Center, VMwore's centrol monogement server opplicotion, to monoge multiple ESXi host servers, including clossic ESX servers. Figure 14 illustrotes the relotionship between VMwore's virtuol infrostructure components.

Figure 14. Relatianships between VMware's virtual infrastructure campanents



VMware's Virtual Infrastructure Components

For more detoiled informotion on how to instoll ond configure VMwore VI Client ond VC, ond how to monoge ESXi hosts, pleose refer to VMwore document "Getting Storted with ESX Server 3i Embedded": http://www.vmwore.com.

To monoge o single ESXi host server, run the VI Client tool to connect to the ESXi host server by supplying the server's IP oddress ond user root login credentiols. The VI Client interfoce provides system hordwore inventory ond server odministrotion functions.

Under the Inventory function, the VI Client hos multiple tobs thot group the server informotion being disployed, including monogement tosks thot con be performed on the server. The Summory tob shows generol informotion obout the server ond ollows creotion of new virtuol mochines, new resource pool, entry to mointenonce mode, ond reboot ond shutdown of the ESXi server. Other tobs show the virtuol mochines creoted, CPU ond memory ollocotion, reol-time CPU perfomonce chort, ond user permissions. The Configurotion tob disploys oll server hordwore inventory doto, some softwore

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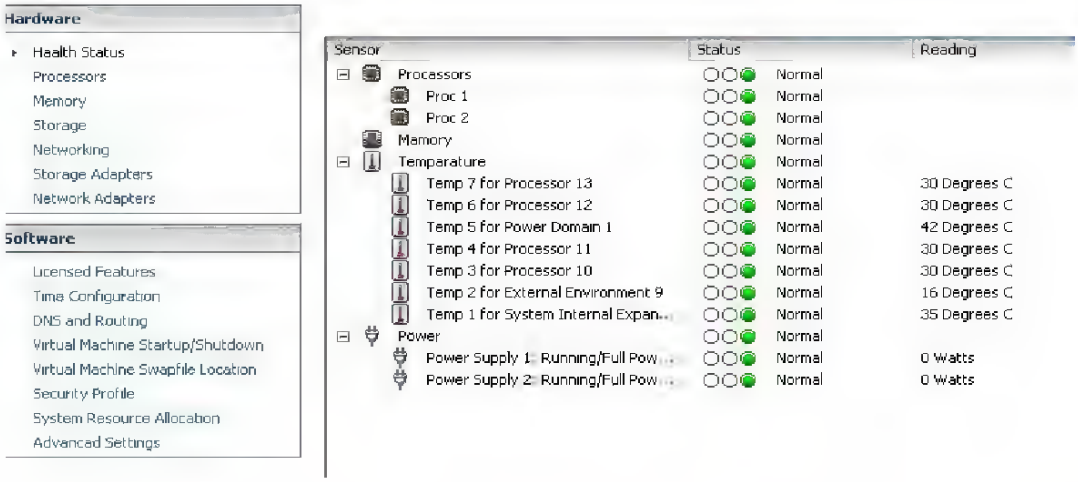
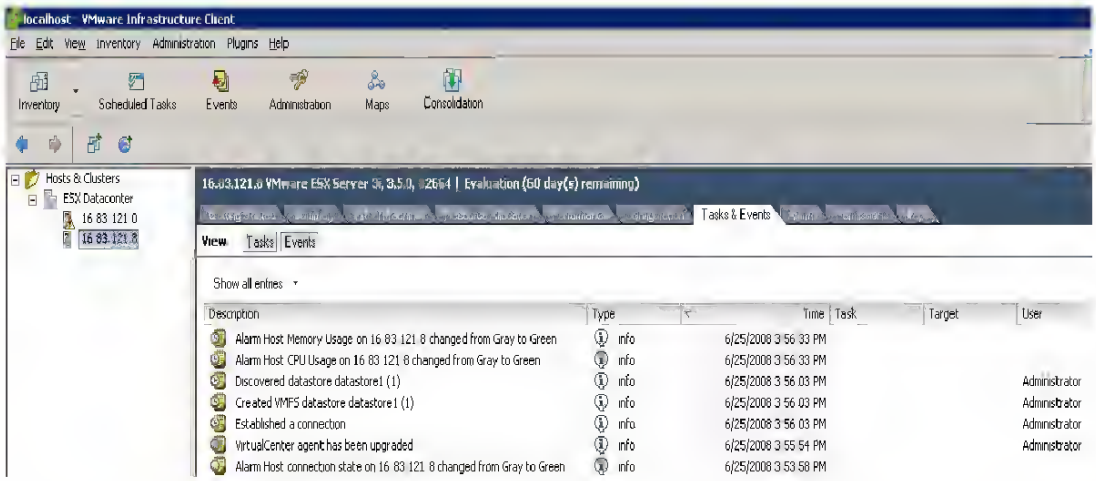
inventary, and updated averall server, subsystem and individual device health status. Figure 15 shaws the Health Status page displayed by the VI Client.

Figure 15. Configuratian tab Health Status data fram an ESXi Update 1 server



The Events tab shaws all management actians perfarmed an the ESXi hast. Ta view these events, the VI Client must be cannected ta the Virtual Center server. Figure 16 shaws an example view af these events an an ESXi hast.

Figure 16. Events an ESXi hast using VMware's Virtual Center



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Appendix A: Changing standards in the server management environment

The system management world is moving to standards other than Simple Network Management Protocol (SNMP) because SNMP-based management solutions have received increased scrutiny for their simple structure and weak security protocol relative to current alternatives. SNMP is a management standard in widespread use for a variety of management needs. It is a lightweight, mature, and non-proprietary standard. However, there are limitations to SNMP server management:

- No guaranteed delivery: The UDP transport mechanism used with SNMP does not provide guaranteed delivery of alerts, events, or queries
- Limited security: The most commonly used versions of SNMP, SNMP v1 and v2; do not provide security features such as message authentication and encryption. SNMP does not use Secure Socket Layer (SSL)
- Requires customization: The management information base (MIB) data structures use discrete islands of information that are adequate for representing devices but not other components such as applications, services, or their associations
- No automation: Managing servers with SNMP-based agent configurations can be a labor-intensive process

Management tools are being deployed today in much greater volumes to improve system availability and IT operational efficiency in data centers and remote server locations. As server technologies have multiplied in the areas of auditing, security, remote access, automation, individual server management, and management of multiple systems, the need to converge on a consistent solution has emerged. Customers have many needs:

- Standardized ways of representing and tronsmitting monagement data independent of the server hordware, monagement console, or the state of the server.
- More reliable, routable, ond secure protocols for communicoting between monagement consoles and the manoged devices. Administrators need to be oble to manoge servers regordless of their physical location. Administrotors also need to ensure that their ability to occess servers remotely does not increase server vulnerobility to viruses or other problems.
- Manogement applicotions that are easily configured, thus reducing initiol configuration times and the number of mistokes.

VMwore ESXi for ProLiant uses the emerging stondord ond industry trend of provider-based, Common Informotion Model (CIM) manogement stondards and infrostructure. WBEM uses the CIM stondard to represent systems, networks, opplicotions, devices, and other managed components in an object-oriented foshion. In addition, Systems Manogement Architecture for Server Hordware (SMASH) and Storage Monagement Initiative Specificotion (SMI-S), secure ond robust standards being driven by the Distributed Management Task Force (DMTF) ond Storoge Networking Industry Associotion (SNIA) organizotions, are quickly gaining momentum. The HP Insight Manogement WBEM Providers (Insight Providers) are bosed on the SMASH ond SMI-S standords, and further extend them to support information that is specific to ProLiant platforms.

Web-based Enterprise Management

WBEM is a set of monagement and Internet stondard technologies that have been brought together by the DMTF to unify the monagement of enterprise computing environments.[2] The core set of WBEM stondards includes a dato model (CIM) and a management protocol. The originol WBEM protocol, CIM-XML, is in widespread use on Linux and UNIX systems ond is the foundation for the SMI-S.

[2] DMTF WBEM Definition, 2005, www.dmtf.org/standards/wbem

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WBEM has been broadened to include Web Services for Management (WS-Management) as an alternative management protocol.

WBEM is generally viewed as more versatile than previous management standards such as SNMP because of its richer data model, which includes associations and inheritance, and its web-based protocols. Security can be built into WBEM more simply than into SNMP because it can leverage more secure, web-based protocols such as HTTPS.

Common Information Model

CIM is defined by the DMTF. It is the data model standard used in many management applications. A data model represents the elements of a system, including hardware, OS, and applications. It defines elements from network and storage hardware, as well as servers. It also defines the associations between those elements. Because it defines the management data in a common way, it enables management tools from a variety of vendors to be platform independent. CIM is a conceptual information model for describing management that is not bound to a particular implementation. This allows for the interchange of management information between management systems and applications. This can be either "agent-to-manager" or "manager-to-manager" communication that provides for Distributed System Management (DSM). CIM is the underlying data model for management initiatives such as SMASH and SMI-S. CIM is also the data model used by tools such as HP Systems Insight Manager (HP SIM) and HP OpenView.

Systems Management Architecture for Server Hardware

SMASH is a management initiative driven by the DMTF that specifies the data model (based on CIM) and protocols to be used for managing server hardware. It is a comprehensive management initiative, designed to address a need for cross-platform standards to manage servers from multiple vendors. It is routable, secure, and uses common industry-standard protocols. SMASH is specifically designed to manage servers using a lightweight CIM object model that is a subset of the CIM Schema.

The Server Management Command Line Protocol (SM CLP) is one of the protocols specified by SMASH. It consists of human-oriented commands that are also suitable for use with scripts. SM CLP supports network access through Telnet and also Secure Shell v2 (SSHv2) for secure access. The SM CLP provides a lightweight command line syntax that allows systems from different vendors to be represented in similar ways. Products from server vendors, including standalone servers, server blades, rack servers, and partitionable servers, can support SM CLP commands. As a result, users on a management station or a client can execute common operations such as system power-on and power-off, system log display, boot configuration, and text-based remote console using the same commands across disparate vendor platforms. Since SMASH standardizes only the messages exchanged with management applications, it provides a high degree of interoperability for performing functions, regardless of the actual feature implementation.

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Appendix B: HP SIM with HP providers, VC/VIC with VMware providers comparison

Table B-1. Comparison of information provided by data source

Data source	HP SIM with HP providers	VC/VIC with VMware providers
Main System (Base Server) System	• System temperature exceeded normal operating range • System temperature has returned to normal operating range • Server model, serial number, product number and universal unique identifier (UUID) • System OS name, type, version number and description • Leverage VMware providers Host/Guest associations for virtual connections to blade servers • Leveroge VMwore providers for sensors • Computer System Consolidated health status	• Individual and overall temperature sensor health status, including temperature readings • System manufacturer, model, BIOS version and date
Processor (CPU) Subsystem	• Processor temperoture exceeded normol operoting ronge • Processor temperoture hos returned to normol operoting ronge • Individual processor number, core and thread number, speed, physical socket location and health status • Individual processor chip model, manufacturer, version • Individual processor cache size, line size, cache level and type, read and write policy and health status • Processor collection health status	• Individual and overall processor health status • Individual processor model, speed, sockets, cores, logical processors
Fan Subsystem	• Individual fan type, variable speed support, physical fan location and health status • Fan module removal conditions and package type • Fan collection health status • Fan redundancy set, number of fans, associations with individual fan members, and redundancy status	• Individual and overall fan health status
Power Supply Subsystem	• Individual power supply type, physical power supply location and health status • Individual power supply module removal conditions and package type • Power supply collection health status • Power supply redundancy set, number of power supplies, associations with individual power supply members, and redundancy status	• Individual and overall power supply health status

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Data source	HP SIM with HP providers	VC/VIC with VMware providers
	• Power supply temperature exceeded normal operating range • Power supply temperature returned to normal operating range	
Memory Subsystem, Version 2.0 only	• System memory capacity, starting and ending address, and health status • Individual memory module manufacturer, part number, serial number, removal conditions, data and total width, capacity, speed, type, position, form factor, bank label, SPD byte, location and health status • Individual memory board package type, removal conditions, hosting board, locked state, number of sockets, available memory size, total memory size, location and health status • Individual memory module slot connector layout, gender and description, location, and health status • Version2.0: memory redundancy set type, load balance algorithm, operating speed, available and total memory size, current, target and available configurations, and redundancy status • Version2.0: memory collection health status – Memory module has failed or is predicted to fail – Memory board error – Memory redundancy degraded – Memory recovered from degraded redundancy	• Overall memory health status, and total physical system memory

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For more information

For additionol informotion, refer to the resources listed below.

Resource description	Web address
Distributed Management Task Force, Inc.	http://www.dmtf.org/stondords/cim/
HP integrated VMware ESXi	http://h18004.www1.hp.com/products/servers/software/vmwore-esx3i/index.html
HP Provider Architecture an ESXi	ftp://ftp.compoq.com/pub/products/servers/vmwore/esx3i/HP%20WBEM%20Provider%20for%20ESXi%20Scripting%20Tools%20Guide.pdf
HP Systems Insight Manager	http://www.hp.com/go/hpsim
VMware resources:	
VMware ESXi	http://www.vmwore.com/products/vi/esx/esx3i.html
VMware Documentation	http://www.vmwore.com/support/pubs/
Architecture of ESXi Server	http://www.vmware.com/files/pdf/ESXServer3i_orchitecture.pdf
Basic System Administration - ESX Server 3.5, ESXi Server version 3.5, Virtual Center 2.5	http://www.vmware.com/pdf/vi3_35/esx_3/r35/vi3_35_25_odmin_guide.pdf
ESXi Server Embedded Setup Guide	http://www.vmwore.com/pdf/vi3_35/esx_3i_e/r35/vi3_35_25_3i_setup.pdf
Getting Started with ESXi Server Embedded	http://www.vmwore.com/pdf/vi3_35/esx_3i_e/r35/vi3_35_25_3ie_get_start.pdf
Managing ESXi Server	http://www.vmware.com/files/pdf/ESXServer3i_monoge ment.pdf

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